













practicable to give in preceding REVIEWS. While the records show that during June in past years monthly rainfalls of ten inches or more have, in general, been more numerous than in May, the large increase in the amount of data given in this issue is due largely, as stated above, to a more detailed examination of records and to the receipt of additional data.

The south Atlantic states and upper Mississippi and Missouri valleys are the districts that have been most subjected to excessive rainfalls in June, but even in these districts there are many of the older established stations at which the maximum June rainfalls have not reached ten inches. On the north Pacific coast, at Neah Bay, Wash., 10.28 inches of rain fell in June, 1888. There is no record of any previous May or June rainfall equaling this amount on the north Pacific coast, and there is but one instance on record in which it has been exceeded in April, viz., 10.78, at Olympia, Wash., in 1878. The largest monthly rainfall in June of which there is record is 28.86, at Fernandina, Fla., in 1864. East of the Mississippi River the states in which the rainfalls of June have not reached ten inches are the following: Maine, Vermont, Delaware, West Virginia, and Kentucky.

Westward of the one hundredth meridian very few daily rainfalls amounting to 2.50 inches, or more, have been recorded, while to the eastward of the meridian named there is no state in which they have not occurred. These excessive daily rainfalls have been most frequent in the upper Mississippi and Missouri valleys and along the Gulf and Atlantic coasts. In

seventeen years at Galveston, Tex., daily rainfalls exceeding the amount mentioned have occurred eleven times. Nineteen instances of such rainfalls in June at Saint Louis, Mo., are on record, but as the observations at that place cover about half a century, it appears that the west Gulf coast is more frequently subjected to excessive daily rainfalls in this month than any other part of the United States. The fall of 10.70 inches at Pensacola, Fla., for the twenty-four hours ending at 3 p. m. on the 29th, 1887, is the maximum daily amount shown by the records of the Signal Service.

Hourly rainfalls of 1.00 inch or more, like the excessive daily rainfalls, have seldom occurred to the west of the one hundredth meridian. The upper Mississippi and Missouri valleys and south Atlantic coast have been most commonly subjected to rainfalls classed under this heading. Probably one of the most remarkable falls of which there is record is that which occurred at Clear Creek, Nebr., on the 25th, 1882, when there was an actual fall of 3.03 inches in thirty-five minutes; rate per hour 5.22. A fall of 3.95 inches in fourteen minutes (rate per hour, 16.80) is reported to have occurred at Galveston, Tex., on the 14th, 1871, but there is doubt as to the accuracy of the time in which this amount is reported to have fallen. Numerous instances of rainfalls of short duration give a rate per hour in excess of the amounts recorded at Clear Creek and Galveston, but in such cases the actual fall has been small in comparison with that recorded in these two instances in which it exceeded 3.00 inches.

## WINDS.

The most frequent directions of the wind during June, 1888, are shown by arrows flying with the wind. In the Southern States the prevailing winds were southerly; in the extreme northwest and upper Missouri valley, northerly; along the New England and middle Atlantic coast, mostly from east or southeast; in other districts, variable.

### HIGH WINDS (in miles per hour).

The maximum velocity of wind for June, 1888, at Signal Service stations where the movements are registered, are given in the table of miscellaneous meteorological data. Other than the maximum velocities given in this table, the following have been reported: Fort Maginnis, Mont., 60, nw., 4th; 60, nw., 20th; 72, nw., 22d. Fort Canby, Wash., 54, s., 18th.

### LOCAL STORMS.

**1st. Tennessee.**—Memphis: a wind velocity of fifty-four miles per hour was recorded at 9.35 p. m. This storm unroofed numerous buildings and caused damage to boats lying in the river at this place.

**2d. Arkansas.**—Twelve houses in a village in Washington county are reported to have been destroyed by a severe storm on this date. **North Carolina.**—Milton, Caswell Co.: about 4 a. m. a violent and destructive hail storm passed near this place. Its path was about five hundred yards wide and its length about twenty-five miles. Hail of unusual size fell in large quantities, causing great damage to crops; several buildings were destroyed.

**3d. California.**—Red Bluff: a severe thunder-storm, accompanied by rain and hail, passed over this place from south to north between 8.20 and 9.15 p. m. The rainfall in twenty-five minutes amounted to 0.51 inch.

**5th. North Carolina.**—Between 6 and 7 p. m. a storm passed eastward through the central portion of Cumberland county and thence into Sampson county, destroying timber, crops, etc. About the same time a similar storm passed from northwest to southeast through Harnett county.

**6th. Maine.**—Buckfield, Oxford Co.: considerable damage was done in this vicinity by hail and lightning during the evening. Large hail is also reported to have fallen at Mon-

mouth, Kennebec Co. **Massachusetts.**—Boston: severe thunder-storms occurred in the western part of the state. In Berkshire county large trees were uprooted by the wind; much damage was done by lightning at various points. **Ontario.**—Ottawa: the severe storm which occurred in the afternoon lasted nearly an hour and caused a large amount of damage. The wind reached a velocity of 80 miles per hour and in the surrounding country blew down many buildings, among which were a number of school houses; several persons were injured, some fatally. **Quebec.**—Montreal: a storm of unusual severity occurred in the afternoon; damage estimated at \$100,000 was done in this city and in surrounding parishes. In some sections scarcely a barn was left standing. **Vermont.**—Saint Johnsbury, Caledonia Co.: a severe storm, accompanied by hail, occurred about 5 p. m. Much glass was broken by hail and some damage was done by wind. Burlington, Chittenden Co.: some of the largest hail seen at this place for a number of years fell during the severe thunder-storm of this date. Lunenburg, Essex Co.: a severe storm occurred to the west and south of this place about 4 p. m. Several buildings were unroofed, and the country was deluged by heavy rain. In some sections, for miles in extent, the trees were stripped of the leaves by hail and hundreds of them blown down; in an orchard of two acres but two trees were left standing.

**6-7th. New Hampshire.**—Littleton, Grafton Co.: the wind and hail storm during the night was unusually severe and caused much damage.

**7th. Illinois.**—About 3 p. m. a tornado passed in a north-easterly direction near Texas City, Saline Co., causing damage to buildings, orchards, etc. **New York.**—A tornado is reported to have caused considerable damage in the evening at Kingsbury, Washington Co.; a number of dwellings and barns were blown down. **Tennessee.**—Forest Home, Williamson Co.: a very severe hail storm occurred in this vicinity, causing a large amount of damage to wheat which was ready for harvesting. **Texas.**—A "cloud burst," accompanied by hail and high winds, is reported to have occurred in Montague county in the evening. A large area is said to have been submerged, entailing extensive damage.

**8th. Dakota.**—Fort Totten: an easterly gale, during which